SEMESTER END EXAMINATION APRIL-MAY, 2026

Course Name: - B.TECH. Hons.(CSE with AI&FM) **Semester:- IV**

Paper Name: - STATISTICAL ANALYSIS AND COMPUTING **Paper Code:- NAM-405**

Time - 3 Hrs + 20 minutes per hour extra time for V.I. & examinees with writer. **Max Marks-70**

Instructions:

- The question paper consists of three sections namely A, B, C. All sections are compulsory.
- Section A- Each question carries **3 mark. All questions are compulsory.**
- Section B- Answer any **5 out of 7** given questions. Each question carries **7 marks.**
- Section C- Answer any **2 out of 3** given questions. Each question carries **10 marks.**

Section – A

Multiple Choice Questions

1. Answer all the following questions. **5x3 =15**

i) Consumer Price **Index** (CPI) measures:
A) Industrial production
B) Price level of consumer goods •
C) National income
D) Export value

ii) Long-term movement in time series is called:
A) Seasonal variation
B) Cyclical variation
C) Trend •
D) Random variation

iii) Regression analysis is used to:
A) Predict one variable from another •
B) Measure dispersion
C) Measure skewness
D) Calculate index

iv) Positive skewness means:
A) Tail on left side
B) Tail on right side •
C) No tail
D) Symmetric

v) Mode is:
A) Highest value
B) Lowest value
C) Most frequent value •
D) Mean value

Section – B

Short Answer Questions

2. Answer any five of the following questions. **5x7=35**

i. Explain the concept of weighted arithmetic mean. When is it used? Discuss with formula for an example

ii. A company has two departments, A and B, with the following monthly salary (₹) data for a sample of employees:

Department A	**2500**	**2800**	**3100**	**3400**	**3700**
Department B	**2800**	**2900**	**3000**	**3100**	**3200**

1) Calculate the standard deviation for each department.
2) Compute the coefficient of variation (CV) for both.
3) Which department has more consistent salaries? Justify

iii. Under what circumstances is the mode the most appropriate measure of central tendency? Provide examples

iv. Set up an analysis of variance table for the following per acre production data for three varieties of wheat, each grown on 4 plots and state if the variety differences are significant.

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Plot Of land	Per acre production data Variety of wheat		
	A	B	C
1	6	5	5
2	7	5	4
3	3	3	3
4	8	7	4

v. From the data given below compute the regression equations by the method of least squares. Plot the two regression lines and from the graph obtain a value of X when Y is 110 and a value of Y when X is 23. Verify the result algebraically.

X: 10, 15, 35, 40, 50
Y: 100, 90, 110, 80, 120

vi. Calculate trend by, from yearly moving average of the data given bellow (NO need to draw trend line) 2 moving average, 3 moving average, 4 moving average and 5 moving average

Year:	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Production:	614	615	652	678	681	655	717	719	708	779	757

vii. Analyze how a financial data analyst integrates statistical methods with Artificial Intelligence tools to enhance financial forecasting, risk management, and strategic investment decisions?

Section – C
Descriptive Questions

3. Answer any two of the following question. **2x10=20**

i. Explain following Basic concepts in the context of testing of hypotheses
(a) Null hypothesis and alternative hypothesis
(b) The level of significance
(c) Decision rule or test of hypothesis
(d) Type I and Type II errors
(e) Two-tailed and One-tailed tests (also draw curve :
Given Z = mod(1.96) for 25% and Z = mod(1.645) for 50%)

ii. Set up an analysis of variance table for the following two-way design results:
Per Acre Production Data of Wheat (in metric tonnes)

Verities of Seeds / Varieties of fertilizers	A	B	C
W	6	5	5
X	7	5	4
Y	3	3	3
Z	8	7	4

Also state whether variety differences are significant at 5% level.

iii. Two research workers classified some people in income groups on the basis of sampling studies. Their results are as follows:

Investigators	*Income groups*			*Total*
	Poor	*Middle*	*Rich*	
A	160	30	10	200
B	140	120	40	300
Total	300	150	50	500

Show that the sampling technique using Chi-square Test $\chi 2$ for two degrees of freedom at 5 per cent level of significance, that research worker is defective.

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Critical Values of χ2

Degrees of freedom	Probability under H_0 that of χ^2 > Chi square						
	.99	.95	.50	.10	.05	.02	.01
1	.000157	.00393	.455	2.706	3.841	5.412	6.635
2	.0201	.103	1.386	4.605	5.991	7.824	9.210
3	.115	.352	2.366	6.251	7.815	9.837	11.341
4	.297	.711	3.357	7.779	9.488	11.668	13.277
5	.554	1.145	4.351	9.236	11.070	13.388	15.086
6	.872	1.635	5.348	10.645	12.592	15.033	16.812
7	1.239	2.167	6.346	12.017	14.067	16.622	18.475
8	1.646	2.733	7.344	13.362	15.507	18.168	20.090
9	2.088	3.325	8.343	14.684	16.919	19.679	21.666
10	2.558	3.940	9.342	15.987	18.307	21.161	23.209
11	3.053	4.575	10.341	17.275	19.675	22.618	24.725
12	3.571	5.226	11.340	18.549	21.026	24.054	26.217
13	4.107	5.892	12.340	19.812	22.362	25.472	72.688
14	4.660	6.571	13.339	21.064	23.685	26.873	29.141
15	4.229	7.261	14.339	22.307	24.996	28.259	30.578
16	5.812	7.962	15.338	23.542	26.296	29.633	32.000
17	6.408	8.672	16.338	24.769	27.587	30.995	33.409
18	7.015	9.390	17.338	25.989	28.869	32.346	34.805
19	7.633	10.117	18.338	27.204	30.144	33.687	36.191
20	8.260	10.851	19.337	28.412	31.410	35.020	37.566
21	8.897	11.591	20.337	29.615	32.671	36.343	38.932
22	9.542	12.338	21.337	30.813	33.924	37.659	40.289
23	10.196	13.091	22.337	32.007	35.172	38.968	41.638
24	10.856	13.848	23.337	32.196	36.415	40.270	42.980
25	11.524	14.611	24.337	34.382	37.652	41.566	44.314
26	12.198	15.379	25.336	35.363	38.885	41.856	45.642
27	12.879	16.151	26.336	36.741	40.113	44.140	46.963
28	13.565	16.928	27.336	37.916	41.337	45.419	48.278
29	14.256	17.708	28.336	39.087	42.557	46.693	49.588
30	14.953	18.493	29.336	40.256	43.773	47.962	50.892

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Critical Values of F-Distribution (at 5 per cent)

v_2 \ v_1	1	2	3	4	5	6	8	12	24	∞
1	161.4	199.5	215.7	224.6	230.2	234.0	238.9	243.9	249.1	243.3
2	18.51	19.00	19.16	19.25	19.30	19.33	19.37	19.41	19.45	19.50
3	10.13	9.55	9.28	9.12	9.01	8.94	8.85	8.74	8.64	8.53
4	7.71	6.94	6.59	6.39	6.26	6.16	6.04	5.91	5.77	5.63
5	6.61	5.79	5.41	5.19	5.05	4.95	4.82	4.68	4.53	4.36
6	5.99	5.14	4.76	4.53	4.39	4.28	4.15	4.00	3.84	3.67
7	5.59	4.74	4.35	4.12	3.97	3.87	3.73	3.57	3.41	3.23
8	5.32	4.46	4.07	3.84	3.69	3.58	3.44	3.28	3.12	2.93
9	5.12	4.26	3.86	3.63	3.48	3.37	3.23	3.07	2.90	2.71
10	4.96	4.10	3.71	3.48	3.33	3.22	3.07	2.91	2.74	2.54
11	4.84	3.98	3.59	3.36	3.20	3.09	2.95	2.79	2.61	2.40
12	4.75	3.88	3.49	3.26	3.11	3.00	2.85	2.69	2.51	2.30
13	4.67	3.80	3.41	3.18	3.02	2.92	2.77	2.60	2.42	2.21
14	4.60	3.74	3.34	3.11	2.96	2.85	2.70	2.53	2.35	2.13
15	4.54	3.68	3.29	3.06	2.90	2.79	2.64	2.48	2.29	2.07
16	4.49	3.63	3.24	3.01	2.85	2.74	2.59	2.42	2.24	2.01
17	4.45	3.59	3.20	2.96	2.81	2.70	2.55	2.38	2.19	1.96
18	4.41	3.55	3.16	2.93	2.77	2.66	2.51	2.34	2.15	1.92
19	4.38	3.52	3.13	2.90	2.74	2.63	2.48	2.31	2.11	1.88
20	4.35	3.49	3.10	2.87	2.71	2.60	2.45	2.28	2.08	1.84
21	4.32	3.47	3.07	2.84	2.68	2.57	2.42	2.25	2.05	1.81
22	4.30	3.44	3.05	2.82	2.66	2.55	2.40	2.23	2.03	1.78
23	4.28	3.42	3.03	2.80	2.64	2.53	2.38	2.20	2.01	1.76
24	4.26	3.40	3.01	2.78	2.62	2.51	2.36	2.18	1.98	1.73
25	4.24	3.38	2.99	2.76	2.60	2.49	2.34	2.16	1.96	1.71
26	4.22	3.37	2.98	2.74	2.59	2.47	2.32	2.15	1.95	1.69
27	4.21	3.35	2.96	2.73	2.57	2.46	2.31	2.13	1.93	1.67
28	4.20	3.34	2.95	2.71	2.56	2.45	2.29	2.12	1.91	1.65
29	4.18	3.33	2.93	2.70	2.54	2.43	2.28	2.10	1.90	1.64
30	4.17	3.32	2.92	2.69	2.53	2.42	2.27	2.09	1.89	1.62
40	4.08	3.23	2.84	2.61	2.45	2.34	2.18	2.00	1.79	1.51
60	4.00	3.15	2.76	2.52	2.37	2.25	2.10	1.92	1.70	1.39
120	3.92	3.07	2.68	2.45	2.29	2.17	2.02	1.83	1.61	1.25
∞	3.84	2.99	2.60	2.37	2.21	2.10	1.94	1.75	1.52	1.00

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